BUILDING AN ASSET MANAGEMENT GEODATABASE FOR RANCHING

Matt Crawford, GISP
East Foundation

- East Family Legacy
  - Tom T. East and Alice Kleberg
  - Robert and Lica East
- Mission
  - Research
  - Education
  - Outreach
Scope of Work

• Design, build, and implement a geodatabase
  • Perform inventory of East Foundation assets and incorporate into GDB
    • Compile existing GIS data sources and convert into ESRI compatible formats
    • Use high resolution imagery to digitize features and assets
    • Where appropriate, use GPS to inventory assets in the field
  • Develop metadata for GIS layers
  • Develop quality controls for geodatabase
  • Develop data standards for external and internal data

• Provide geospatial support
  • Provide geospatial training
  • Provide guidance and encouragement for staff using GIS products
  • Provide support for research projects within the Foundation
  • Develop multiple user interfaces for East personnel to access and interact with GIS
Design Geodatabase

• Interviews with East Foundation staff
  • Features to be collected
    • Fences, roads, and wells
  • Attributes of features
    • Construction materials
    • Condition of features
    • Installation dates
    • Water wells

• Meetings with IRNR GIS team
  • Database structure
  • Naming conventions
Perform inventory of East Foundation assets

• Compile existing data
  • Global Mapper
    • Fences
    • Water wells
  • Interoperability Extension
    • Converted all existing data into ESRI formats
    • Projected all data into NAD 83 Zone 14 N

• Assessing accuracy
  • Remote sensing
  • GPS data collection
Perform inventory of East Foundation assets (cont.)

- Digitize features from imagery
  - NAIP Imagery 2012
    - Image server from TNRIS
    - Available at project launch
    - Countywide mosaics
    - Resolution = 1 meter
    - Digitize roads
    - Landscape scale analysis

Scale = 1:1,000
Perform inventory of East Foundation assets (cont.)

• Digitize features from imagery (cont.)
  • Acquisitioned imagery from 2013
    • Municipalities in South Texas
    • Acquired February 2014
    • Created image service
    • Resolution - 9 inch
      • Jim Hogg County
      • Starr County
    • Resolution – 12 inch
      • Willacy County
    • Digitize most assets

Scale = 1: 1,000
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS...
  - GPS Hardware
    - Trimble
      - Yuma 2 with Pro 6T receiver
      - Tablet
      - Range pole with receiver
    - GeoExplorer 5T
      - Handheld units
      - Smaller than Geo XT
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - GPS Software
    - Trimble TerraSync
      - Installed on all units
  - Trimble Pathfinder Office
    - Installed on Yuma
    - Installed on office PC
Perform inventory of East Foundation assets (cont.)

• Where appropriate, use GPS... (cont.)
  • Development of GPS data dictionary
    • Built in Pathfinder Office
    • Match geodatabase
    • Simple
    • Changed according to database needs
      • Adding new features
      • Adding new menus
      • Adding photos
Perform inventory of East Foundation assets (cont.)

• Where appropriate, use GPS... (cont.)
  • Fieldwork
    • Field tests
      • December 2013
        • Initial field test of equipment and dictionary
        • Minor adjustments to data dictionary
    • January 2014
      • First major data collection effort
      • Looked at 60 miles of fence
      • Adjust fieldwork logistics and protocols
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Fieldwork
    - Protocol
      - Most features collected as points
      - GPS logging set to 1 sec
      - Features captured for 20 sec
      - PDOP
      - Always take a photo
      - Generic points
      - Changes over time
Perform inventory of East Foundation assets (cont.)

• Where appropriate, use GPS... (cont.)
  • Fieldwork
    • Assets collected
      • Infrastructure
      • Utilities
      • Historical features
  • Total collection efforts
    • 681 miles of fence
    • 1,667 gates
    • 280 water wells
    • 676 miles of road
Perform inventory of East Foundation assets (cont.)

• Where appropriate, use GPS... (cont.)
  • Fieldwork
    • Infrastructure
    • Fence features
      • Braces (H, N, Pull Posts)
      • Corners
      • Intersections
      • Direction changes
    • Fence attributes
      • Style (King Ranch, High, Barb Wire)
      • Condition (Good, Fair, Poor)
      • Status (Normal, Needs Repair, Abandoned)
Perform inventory of East Foundation assets (cont.)

• Where appropriate, use GPS... (cont.)
  • Fieldwork
    • Thousands of locations
      • Gates
      • Water wells
      • Water tanks
      • Electric meters
      • Risers
      • Property markers
      • Trash
      • Rain gauges/Weather stations
      • HALO emergency landing zones
Perform inventory of East Foundation assets (cont.)

• Where appropriate, use GPS... (cont.)
  • Fieldwork
    • San Antonio Viejo ~ 149,000 acres
      • 13 week-long field trips between January and September
      • 452 miles of fence
      • 1,205 gates
      • 191 water wells
Perform inventory of East Foundation assets (cont.)

• Where appropriate, use GPS... (cont.)
  • Fieldwork

Gachupin
640 ac

Ranchito
5,000 ac

Buena Vista
15,000 ac

Santa Rosa
18,000 ac

El Sauz
27,000 ac
Incorporate assets into geodatabase

• Post-processing
  • Pathfinder Office
    • Data transfer
    • Differential correction
    • GDB export compatibility
Incorporate assets into geodatabase (cont.)

- Post-processing (cont.)
  - Geodatabase population
    - Existing features
      - Adjusted locations to match
    - Populated attributes
      - GPS location attributes
      - GPS location photos
  - QA/QC
Management of assets

- ArcReader
  - Desktop viewing
  - Query information
  - Calculate information
  - Report discrepancies
Management of assets (cont.)

• ArcGIS app
  • Mobile viewing
  • Real-time location information
  • Calculate distances
  • Report information with location
Management of assets (cont.)

• Future Management
  • Collector for ArcGIS
    • Updating information and attributes
      • Damaged locations
      • Lock combination changes
      • Gate replacement
      • Water well is undergoing maintenance
  • Adding new features and information
    • Infrastructure
    • Utilities
    • Security incidents
Management of assets (cont.)

• Future Management (cont.)
  • Research
    • Wildlife movement tracking
    • Research plot management
    • Precipitation effects on wildlife

Figure 1. Historical annual rainfall at the NOAA Hebronville, TX site
Management of assets (cont.)

• Future Management (cont.)
  • Livestock
    • Grazing management
    • Stocking rates
    • Herd movement tracking
Conclusion
Contact Information

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